Customized FORM PTO-1390 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY DOCKET NO.
P07140US00/DEJ

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)
09/787710

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/AU99/00826	27 SEPTEMBER 1999	28 SEPTEMBER 1998

TITLE OF INVENTION: APPARATUS AND METHD FOR AVOIDING OCULAR MUSCULAR FATIGUE

APPLICANT(S) FOR DO/EO/US: LEE, Henri K.

Applicant herewith submits to the US Designated/Elected Office (DO/EO/US) the following items and other information:

- ☒ 1. This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
- ☐ 2. This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
- ☒ 3. This express request to begin national examination procedures (35 USC 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 USC 371(b) and PCT Art. 22 and 39(1).
- ☒ 4. A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
- ☒ 5. A **copy** of the International Application as filed (35 U.S.C. 371 (c)(2))
  - ☐ a. is transmitted herewith (required only if not transmitted by the International Bureau).
  - ☒ b. has been transmitted by the International Bureau.
  - ☐ c. is not required, as the application was filed in the United States Receiving Office (RO/US).
- ☐ 6. A **translation** of the International Application into English (35 U.S.C. 371(c)(2)).
- ☒ 7. Amendments to the claims of the International Appln. under PCT Article 19 (35 USC 371 (c)(3))
  - ☐ a. are transmitted herewith (required only if not transmitted by the International Bureau).
  - ☐ b. have been transmitted by the International Bureau.
  - ☐ c. have not been made; however, the time limit for making such amendments had NOT expired.
  - ☒ d. have not been made and will not be made.
- ☐ 8. A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
- ☐ 9. An **oath** or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
- ☐ 10. A translation of the annexes to the Int'l Prelim. Exam. Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 20. below concern document(s) or information included:

- ☐ 11. An **Information Disclosure Statement** under 37 C.F.R. 1.97 and 1.98.
- ☐ 12. An **Assignment** document for recording. A separate cover sheet in compliance with 37 CFR 3 28 and 3 31 is included
- ☒ 13. A **First preliminary amendment**.
- ☐ 14. A Second or Subsequent preliminary amendment.
- ☐ 15. A substitute specification.
- ☐ 16. A change of power of attorney and/or address letter.
- ☐ 17. A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 & 35 USC 1.821-825.
- ☐ 18. A second copy of the published international application under 35 USC 154(d)(4).
- ☐ 19. A second copy of the English translation of the international application under 35 USC 154(d)(4).
- ☐ 20. Other items or information:
  - ☐
  - ☐

- ☐ A copy of the Notification of Missing Requirements under 35 U.S.C. 371.
- ☐ In the event that a petition for extension of time is required to be submitted herewith, and in the event that a separate petition does not accompany this response, applicant hereby petitions under 37 CFR 1 136(a) for an extension of time of as many months as are required to render this submission timely. Any fee is authorized in 17(c).

Date: 21 March 2001

LARSON & TAYLOR, PLC • 1199 North Fairfax St. • Suite 900 • Alexandria, VA 22314

U.S. APPLICATION NO. *(If known)* 09/787710	INTERNATIONAL APPLICATION NO. PCT/AU99/00826	ATTORNEY DOCKET NO. P07140US00/DEJ

		CALCULATIONS *PTO USE ONLY*
☒ 21. **The following fees are submitted:**		
☒ **Basic National Fee** (37 CFR 1.492 (a) (1)-(5):		
☒ Neither Int'l Prelim. Exam. fee nor Int'l Search fee paid to USPTO	$1000	
☐ Search Report has been prepared by the EPO or JPO	$ 860	
☐ No Int'l Prelim. Ex. fee paid to USPTO but Int'l Search fee paid to USPTO	$ 710	
☐ International preliminary examination fee paid to USPTPO	$ 690	
☐ Int'l Prelim. Ex. fee paid to USPTO & all claims satisfied PCT Art. 33(1)-(4)	$ 100	
ENTER APPROPRIATE BASIC FEE AMOUNT =		$ 1000
☐ Surcharge of **$130** for furnishing the oath or declaration later than ☐ 20 mos. ☐ 30 mos. + from the earliest claimed priority date (37 CFR 1.492(e)).		$

CLAIMS	*NUMBER FILED*	*NUMBER EXTRA*	*RATE*	
Total Claims	47 - 20 =	27	X **$18** =	$ 486
Independent Claims	12 - 03 =	9	X **$80** =	$ 720
☐ Multiple Dependent Claim(s) (if applicable)			+ **$270** =	$
TOTAL OF ABOVE CALCULATIONS =				**$** 2206
☒ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by ½.			-	$ 1103
SUBTOTAL =				**$** 1103
☐ Processing fee of **$130** for furnishing the **English translation** later than ☐ 20 mos. ☐ 30 mos. + from the earliest claimed priority date (37 CFR 1.492(f)).				$
TOTAL NATIONAL FEE =				**$** 1103
☐ Fee for recording the enclosed **assignment** (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40** per property			+	$
TOTAL FEES ENCLOSED =				**$** 1103
Amount to be				*Refunded* $
				Charged $

☒ a. A **check** in the amount of $1103.00 to cover the above fees is enclosed.

☐ b. Please charge my Deposit Account No. 12-0555 in the amount of $ to cover the above fees.

☒ c. The Commissioner is hereby authorized to charge any additional fees required or credit overpayment to Deposit Account No. 12-0555.

Note: *Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.*

SEND ALL CORRESPONDENCE TO:

DOUGLAS E. JACKSON

At the address (below) of **CUSTOMER NO. 00881.**

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SIGNATURE: Douglas E Jackson

NAME: Douglas E. Jackson

REG. NO.: 28518

PHONE NO.: 703-739-4900

Date: 21 March 2001

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent

In re patent application of: LEE

Serial No.: New Application — Examiner:

Filed: On even date herewith — Art Unit:

For: APPARATUS AND METHOD FOR AVOIDING OCULAR MUSCULAR FATIGUE — Docket No.: P07140US00

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C.

S I R:

Prior to examination of the above-identified application, please amend the application as follows.

IN THE CLAIMS

A clean version of all pending claims is provided herewith in **Attachment A**. It will be noted that claims 5-18, 23-47 have been amended relative to the previously provided version as shown by the marked up version thereof in **Attachment B** provided herewith.

REMARKS

The above amendments to claims have been made in order place the application in better condition for examination and for the purpose of reducing the filing fees.

Further and favorable action is solicited.

Respectfully submitted,

Date: 3/21/2001

By: Douglas E. Jackson
Douglas E. Jackson
Reg. No. 28518

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ATTACHMENT A

Clean Replacement/New Claims (entire set of pending claims)

Following herewith is a clean copy of the entire set of pending claims.

1. An apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein each of said optical elements comprising a spherical optical wedge with a base, said it bases being adjacent thereby forming base-in prisms.

2. An apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user; and

adjustment means for adjusting the separation of said optical elements according to pupil separation of a user.

3. An apparatus for avoiding ocular muscular fatigue comprising a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein said optical elements are 0.2 to 10 bass lenses.

4. An apparatus for avoiding ocular muscular fatigue comprising a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus Is worn by a user, wherein said optical elements are additionally prescription lenses.

5. (amended) An apparatus as claimed in claim 1, wherein said binocular light converging means is integral.

6. (amended) An apparatus an claimed in claim 1, wherein said binocular light converging means is of polycarbonate, acrylic or some other polymeric plastic material.

7. (amended) An apparatus as claimed in claim 1, wherein said binocular light converging means is a magnifying binocular light converging means.

8. (amended) An apparatus as claimed in claim 1, wherein said binocular light converging ' means includes or is additionally at least one colour filter.

9. (amended) An apparatus as claimed in claim 1, wherein said binocular light converging means includes or in additionally at least one colour filter, and said at least one colour filter reduces the intensity of transmitted yellow light.

10. (amended) An apparatus as claimed in claim 1, wherein said apparatus includes adjustment means whereby the separation of the optical elements can be adjusted according to pupil separation of a user.

11. (amended) An apparatus as claimed in claim 1, wherein said light converging means Comprises two lenses.

12. (amended) An apparatus as claimed in claim 2, wherein each of' said optical elements comprises an optical wedge with a base, wherein said bases of said lenses are adjacent thereby. forming base-in prisms.

13. (amended) An apparatus as claimed in claim 2, wherein each of said optical elements comprises a spherical optical wedge with a base, and said bases of said lenses are adjacent thereby forming base-in prisms.

14. (amended) An apparatus as claimed in claim 1, wherein said optical elements are 0.2 to 10 base lancer..

15. (amended) An apparatus as claimed in claim 1, wherein said optical elements are 0.25 to 1.5 base lenses.

16. (amended) An apparatus as claimed in claim 1, wherein said optical elements are approximately 0.5 base lenses.

17. (amended) An apparatus as claimed in claim 1, wherein said optical elements are additionally prescription lenses.

18. (amended) An apparatus as claimed in claim 1, wherein said optical elements are lenses provided as a pair of spectacles.

19. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements each comprising a spherical optical wedge with a base, wherein said bases of said optical elements are adjacent thereby forming base-in prisms.

20. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, wherein each of said optical elements comprises an optical wedge with a base, said bases of said optical elements are adjacent thereby forming base-in prisms, and said lenses are 0.2 to 10 base lenses.

21. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, wherein optical elements are additionally prescription lenses.

22. A method fox reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of

a pair of optical elements, and adjusting the separation of the optical elements according to pupil separation of a user.

23. (amended) A method an claimed in claim 19, wherein said optical elements are integral with each other.

24. (amended) A method as claimed in claim 19, wherein said optical elements are magnifying optical elements.

25. (amended) A method as claimed in claim 19, wherein said optical elements are a pair of lenses.

26. (amended) A method as claimed in claim 19, wherein said optical elements are a pair of lenses each of which comprises an optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

27. (amended) A method an claimed in claim 19, wherein said optical elements are a pair of lenses each of which comprises a spherical optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming bane-in prisms.

28. (amended) A method an claimed in claim 19, wherein said optical elements are 0.2 to 10 base lenses.

29. (amended) A method as claimed in claim 19, wherein said optical elements are 0.25 to 1.5 base lenses.

30. (amended) A method as claimed in claim 19, wherein said optical elements are approximately 0.5 base lenses.

31. (amended) A method as claimed in claim 19, wherein said optical elements are additionally prescription lenses.

32. (amended) A method as claimed in claim 19, wherein said optical elements axe additionally colour filters.

33. (amended) A method as claimed in claim 19, wherein said optical elements are additionally colour filters that reduce the intensity of transmitted yellow light.

34. (amended) A method as claimed in claim 19, wherein the method includes adjusting the separation of the optical elements according to pupil separation of a user.

35. (amended) A method as claimed in claim 19, including providing said optical elements as a pair of spectacles.

36. (amended)A pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, each of said lenses comprising a spherical optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

37. (amended) A pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, wherein said lenses are 0.2 to 10 base lenses.

38. (amended) A pair of spectacles fox avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, wherein said spectacles are additionally prescription spectacles.

39. (amended) A pair of spectacles for avoiding ocular muscular fatigue comprising:

a pair of convergent lenses for Converging incident light, thereby reducing ocular convergence demand When said spectacles are worn by a user; and adjustment means whereby the lenses, Separation can be adjusted according to pupil separation of a user.

40. (amended) A pair of spectacles as claimed in claim 36, wherein said lenses are 0.25 to 1.5 base lenses.

41. (amended) A pair of spectacles as claimed in claim 36, wherein said lenses approximately 0.5 base lenses.

42. (amended) A pair of spectacles as claimed in claim 36, wherein said lenses are integral with each other.

43. (amended) A pair of spectacles as claimed in claim 36, wherein said lenses are magnifying lenses.

44. (amended) A pair of spectacles as claimed in claim 36, wherein said spectacles are additionally prescription spectacles.

45 (amended) A pair of spectacles as claimed in claim 36, wherein said spectacles include, or said lenses additionally comprise, one or more colour filters.

46. (amended) A pair of spectacles as claimed in claim 36, wherein spectacles include, or said lenses additionally comprise, one or more colour filters, and said one or more colour filters reduce the intensity of transmitted yellow light.

47. (amended) A pair of spectacles as claimed in claim 36, wherein the spectacles are provided with adjustment means whereby the lenses, separation can be adjusted according to pupil separation of a user.

ATTACHMENT B

Marked Up Replacement Claims

Following herewith is a marked up copy of each rewritten claim together with all other pending claims.

1. An apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein each of said optical elements comprising a spherical optical wedge with a base, said it bases being adjacent thereby forming base-in prisms.

2. An apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user; and

adjustment means for adjusting the separation of said optical elements according to pupil separation of a user.

3. An apparatus for avoiding ocular muscular fatigue comprising a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein said optical elements are 0.2 to 10 bass lenses.

4. An apparatus for avoiding ocular muscular fatigue comprising a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus Is worn by a user, wherein said optical elements are additionally prescription lenses.

5. (amended) An apparatus as claimed in ~~any one of claims I to 4~~claim 1, wherein said binocular light converging means is integral.

6. (amended) An apparatus an claimed in ~~any one of claims 1 to 4~~claim 1, wherein said binocular light converging means is of polycarbonate, acrylic or some other polymeric plastic material.

7. (amended) An apparatus as claimed in ~~any one of claims 1 to 4~~claim 1, wherein said binocular light converging means is a magnifying binocular light converging means.

8. (amended) An apparatus as claimed in ~~any one of claims 1 to 4~~claim 1, wherein said binocular light converging ' means includes or is additionally at least one colour filter.

9. (amended) An apparatus as claimed in ~~any one of claims 1 to 4~~claim 1, wherein said binocular light converging means includes or in additionally at least one colour filter, and said at least one colour filter reduces the intensity of transmitted yellow light.

10. (amended) An apparatus as claimed in ~~any one of claims 1, 3 or 4~~claim 1, wherein said apparatus includes adjustment means whereby the separation of the optical elements can be adjusted according to pupil separation of a user.

11. (amended) An apparatus as claimed in ~~any one of claims 1 to 4~~claim 1, wherein said light converging means Comprises two lenses.

12. (amended) An apparatus as claimed in ~~any one of claims 2 to 4~~claim 2, wherein each of' said optical elements comprises an optical wedge with a base, wherein said bases of said lenses are adjacent thereby. forming base-in prisms.

13. (amended) An apparatus as claimed in ~~any one of claims 2 to 4~~claim 2, wherein each of said optical elements comprises a spherical optical wedge with a base, and said bases of said lenses are adjacent thereby forming base-in prisms.

14. (amended) An apparatus as claimed in ~~any one of claims 1, 2 or 4~~claim 1, wherein said optical elements are 0.2 to 10 base lancer..

15. (amended) An apparatus as claimed in ~~any one of claims 1, 2 or 4~~claim 1, wherein said optical elements are 0.25 to 1.5 base lenses.

16. (amended) An apparatus as claimed in ~~any one of claims 1, 2 or 4~~claim 1, wherein said optical elements are approximately 0.5 base lenses.

17. (amended) An apparatus as claimed in ~~any one of claims I to 3~~claim 1, wherein said optical elements are additionally prescription lenses.

18. (amended) An apparatus as claimed in ~~any one of claims I to 4~~claim 1, wherein said optical elements are lenses provided as a pair of spectacles.

19. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements each comprising a spherical optical wedge with a base, wherein said bases of said optical elements are adjacent thereby forming base-in prisms.

20. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, wherein each of said optical elements comprises an optical wedge with a base, said bases of said optical elements are adjacent thereby forming base-in prisms, and said lenses are 0.2 to 10 base lenses.

21. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, wherein optical elements are additionally prescription lenses.

22. A method fox reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, and adjusting the separation of the optical elements according to pupil separation of a user.

23. (amended) A method an claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are integral with each other.

24. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are magnifying optical elements.

~~23~~25. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are a pair of lenses.

~~24~~26. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are a pair of lenses each of which comprises an optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

~~26~~27. (amended) A method an claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are a pair of lenses each of which comprises a spherical optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming bane-in prisms.

~~27~~28. (amended) A method an claimed in ~~any one of claims 19, 21 or 22~~claim 19, wherein said optical elements are 0.2 to 10 base lenses.

~~28~~29. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are 0.25 to 1.5 base lenses.

~~29~~30. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are approximately 0.5 base lenses.

~~30~~31. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are additionally prescription lenses.

~~31~~32. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements axe additionally colour filters.

~~32~~33. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, wherein said optical elements are additionally colour filters that reduce the intensity of transmitted yellow light.

~~33~~34. (amended) A method as claimed in ~~any one of claims 19 to 21~~claim 19, wherein the method includes adjusting the separation of the optical elements according to pupil separation of a user.

~~34~~35. (amended) A method as claimed in ~~any one of claims 19 to 22~~claim 19, including providing said optical elements as a pair of spectacles.

~~35~~36. (amended)A pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, each of said lenses comprising a spherical optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

~~36~~37. (amended) A pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, wherein said lenses are 0.2 to 10 base lenses.

~~37~~38. (amended) A pair of spectacles fox avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, wherein said spectacles are additionally prescription spectacles.

~~38~~39. (amended) A pair of spectacles for avoiding ocular muscular fatigue comprising:

a pair of convergent lenses for Converging incident light, thereby reducing ocular convergence demand When said spectacles are worn by a user; and adjustment means whereby the lenses, Separation can be adjusted according to pupil separation of a user.

~~39~~40. (amended) A pair of spectacles as claimed in ~~any one of claims 35 to 38~~claim 36, wherein said lenses are 0.25 to 1.5 base lenses.

~~40~~41. (amended) A pair of spectacles as claimed in ~~any one of claims 35 to 38~~claim 36, wherein said lenses approximately 0.5 base lenses.

~~41~~42. (amended) A pair of spectacles as claimed in ~~any one of claims 35 to 38~~claim 36, wherein said lenses are integral with each other.

~~42~~43. (amended) A pair of spectacles as claimed in ~~any one of claims 35 to 38~~claim 36, wherein said lenses are magnifying lenses.

~~43~~44. (amended) A pair of spectacles as claimed in ~~any one of claims 35, 36 and 38~~claim 36, wherein said spectacles are additionally prescription spectacles.

~~44.~~45 (amended) A pair of spectacles as claimed in ~~any one of claims 35 to 38~~claim 36, wherein said spectacles include, or said lenses additionally comprise, one or more colour filters.

~~45~~46. (amended) A pair of spectacles as claimed in ~~any one of claims 35 to 38~~claim 36, wherein spectacles include, or said lenses additionally comprise, one or more colour filters, and said one or more colour filters reduce the intensity of transmitted yellow light.

~~46~~47. (amended) A pair of spectacles as claimed in ~~any one of claims 35 to 37~~claim 36, wherein the spectacles are provided with adjustment means whereby the lenses, separation can be adjusted according to pupil separation of a user.

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PCT/AU99/00826
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APPARATUS AND METHOD FOR AVOIDING OCULAR MUSCULAR FATIGUE

The present invention relates to an apparatus and method for the reduction or avoidance of muscular fatigue of the eyes, and is of particular but not exclusive application in avoiding such muscular fatigue encountered during prolonged reading or close use of equipment such as computers.

Existing apparatus for reducing the ill effects to the eyes of prolonged reading or use of computers, or of other activities requiring the intensive, close use of the eyes, include non-prescription spectacles with colour lenses to act as filters 1) to reduce the glare from a surrounding light source and reflection from the surface on which the eyes are focussed, and/or 2) to enhance the contrast sensitivity of the print or material being focussed upon (generally by means of a yellow filter).

Other apparatus can be used to magnify the image on a computer screen, thereby reducing the degree to which a user's eyes must focus small images. Such apparatus may employ 1) one or more Fresnel lenses, and/or 2) low plus lenses which also have magnifying effect, usually ranging from +0.50 to +0.75 spherical dioptre power.

It is an object of the present invention to provide an apparatus and method for reducing or avoiding ocular muscular fatigue in such circumstances.

According to a first broad aspect of the present invention there is provided an apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein each of said optical elements comprising a spherical optical wedge with a base, said bases being adjacent thereby forming base-in prisms.

The present invention also provides an apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, and adjustment means for adjusting the separation of said optical elements according to pupil separation of a user.

The present invention further provides an apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein said optical elements are 0.2 to 10 base lenses.

The present invention still further provides an apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein said optical elements are additionally prescription lenses.

Thus, the extent to which the eyes of a user of a computer or reader of any text material must converge owing to the proximity of that computer or other text material (or other apparatus) is reduced by the apparatus according to the present invention, which performs part or much of the required convergence by means of refraction. The eyes of the user may thereby be directed generally forward and parallel, even though the user is reading material or operating a computer or other apparatus whose proximity would normally require a convergence of as much as 15° or more.

Preferably the binocular light converging means is integral.

Thus, the binocular light converging means may comprise a pair of optical elements (such as lenses) but these are preferably formed integrally.

Preferably the binocular light converging means is of polycarbonate, acrylic or some other polymeric plastic material.

Although the, for example, lenses may be made of glass, it would generally be cheaper and more convenient to construct them from a plastic material, which will also be less vulnerable to breakage.

Preferably the binocular light converging means is a magnifying binocular light converging means.

Thus, the apparatus, in addition to reducing the required ocular convergence, may also magnify the user's view.

Preferably the binocular light converging means includes or is additionally at least one colour filter, preferably for reducing the intensity of transmitted yellow light. Thus, any benefits of reducing particular colour intensities may be combined with those of the convergence according to the present invention.

Preferably the apparatus includes adjustment means whereby the separation of the optical elements can be adjusted according to pupil separation of a user. Thus, the apparatus may be adjusted so that the optical elements are positioned accurately relative to each eye of a user.

Preferably the light converging means comprises two lenses. Thus, although the light converging means are preferably lenses, any suitable alternative may be employed, including prisms.

Preferably each of said optical elements comprises an

optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms. More preferably each of the optical elements comprises a spherical optical wedge.

Thus, the lenses are preferably formed from blanks of spherical form, but thicker at one extremity relative to the other to provide the properties of an optical wedge.

Preferably the optical elements are 0.2 to 10 base lenses, more preferably 0.25 to 1.5 base lenses, and most preferably approximately 0.5 base lenses. Thus, lenses of higher base may be used but in normal use 2 or 3 base lenses may provide excessive convergence.

Thus, the convergence effect of the apparatus according to the present invention may be combined with a corrective prescription to provide prescription glasses that also provide the convergence according to the present invention.

According to a second broad aspect of the present invention there is provided a method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements each comprising a spherical optical wedge with a base, wherein said bases of said optical elements are adjacent thereby forming base-in prisms.

The invention also provides a method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, wherein each of said optical elements comprises an optical wedge with a base, said bases of said optical elements are adjacent thereby forming base-in prisms, and said lenses are 0.2 to 10 base lenses.

The invention further provides a method for reducing ocular

muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, wherein optical elements are additionally prescription lenses.

The invention still further provides a method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, and adjusting the separation of the optical elements according to pupil separation of a user.

According to a third broad aspect of the present invention a pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, each of said lenses comprising a spherical optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

The present invention also provides a pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, wherein said lenses are 0.2 to 10 base lenses.

The present invention further provides a pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, wherein said spectacles are additionally prescription spectacles.

The present invention still further provides a pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said

spectacles are worn by a user; and adjustment means whereby the lenses' separation can be adjusted according to pupil separation of a user.

Preferably the lenses are 0.25 to 1.5 base lenses, and more preferably approximately 0.5 base lenses.

Preferably the lenses are integral with each other. Preferably the lenses are magnifying lenses.

Preferably the spectacles include, or said lenses additionally comprise, one or more colour filters, preferably for reducing the intensity of transmitted yellow light.

It should be noted that the convergence of light produced by the apparatus, method or spectacles according to the present invention will reduce the convergence demand on the user's eyes and thereby increase the divergence of the users eyes.

Preferred embodiments of the invention will be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 is a view of a pair of spectacles in accordance a preferred embodiment of the present invention;

Figure 2 is a cross-sectional view through II-II of Figure 1;

Figure 3 is a view of a pair of spectacles according to a further embodiment of the present invention; and

Figure 4 is a cross-section through IV-IV in Figure 3.

A pair of spectacles according to a preferred embodiment of the present invention is shown generally at 10 in Figure 1. The spectacles 10 have right and left lenses 12 and 14 respectively. Lenses 12 and 14 are polycarbonate or

acrylic 0.5 base-in prismatic lenses (of zero spherical power, that is, so-called plano lenses).

Figure 2 is a view of cross-section II-II in Figure 1, together with ray tracings for a light source 16. Rays 18 and 20 diverging from light source 16 will, after impinging upon lenses 12 and 14 respectively, be refracted convergently, and emerge at 18a and 20b substantially parallel. Thus, when the spectacles 10 are worn by a user, who may be reading from a book or a computer monitor, or manipulating some apparatus at close proximity, the degree of convergence required by that proximity is reduced or in some cases substantially eliminated. Consequently, the muscular effort required to maintain this convergence is correspondingly reduced or eliminated, and the resultant muscular fatigue avoided.

Lenses 12 and 14 have, in this embodiment, a negligible magnifying effect. Thus, the spectacles 10 reduce the convergence demand on the user's eyes, without otherwise substantially altering the user's vision.

A pair of spectacles according to an alternative embodiment of the present invention is shown generally at 30 in Figure 3. In this figure, only the lens portion of the spectacles is illustrated. Lenses 32 and 34 are formed integrally for reasons of manufacturing convenience. However, as can be seen in Figure 4, which is a cross-section through IV-IV in Figure 3, lenses 32 and 34 are again base-in prismatic lenses, though formed within peripheral fabric 36, integral with lenses 32 and 34, which provides and forms the equivalent of the spectacles' frame and nose bridge. As with the first embodiment, light from light source 38 (for example rays 40 and 42) are converged by means of refraction within lenses 32 and 34 to be substantially parallel at 40a and 42a.

In practice, the peripheral fabric 36 may either conform to the spherical geometry of lenses 32 and 34, or be shaped to provide a more comfortable or aesthetically pleasing appearance. In this latter case, it may be desirable to provide peripheral fabric 36 with an opaque mask or substantially opaque colour so that light impinging upon peripheral fabric 36 will not distort or blur the image presented to the user.

Modifications within the spirit and scope of the invention may readily be effected by persons skilled in the art. For example, spectacles according to the present invention may be provided with an adjustable bridge so that the distance between the two lenses is adjustable, to conform to the pupil separation of the user. Further, the lenses may be coloured to remove to some extent or completely certain colours that are thought to contribute to eye strain. Alternatively, the lenses may be somewhat modified to provide some magnification for greater ease of viewing or may superimpose a user's spectacles' prescription on the optical wedge so that other defects of vision of the user may be corrected with the reduction in convergence demand. Accordingly, it is to be understood that this invention is not limited to the particular embodiments described by way of example hereinabove.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein each of said optical elements comprising a spherical optical wedge with a base, said bases being adjacent thereby forming base-in prisms.

2. An apparatus for avoiding ocular muscular fatigue comprising:

a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user; and

adjustment means for adjusting the separation of said optical elements according to pupil separation of a user.

3. An apparatus for avoiding ocular muscular fatigue comprising a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein said optical elements are 0.2 to 10 base lenses.

4. An apparatus for avoiding ocular muscular fatigue comprising a binocular light converging means comprising two optical elements for converging incident light, thereby reducing ocular convergence demand when said apparatus is worn by a user, wherein said optical elements are additionally prescription lenses.

5. An apparatus as claimed in any one of claims 1 to 4, wherein said binocular light converging means is integral.

6. An apparatus as claimed in any one of claims 1 to 4, wherein said binocular light converging means is of

polycarbonate, acrylic or some other polymeric plastic material.

7. An apparatus as claimed in any one of claims 1 to 4, wherein said binocular light converging means is a magnifying binocular light converging means.

8. An apparatus as claimed in any one of claims 1 to 4, wherein said binocular light converging means includes or is additionally at least one colour filter.

9. An apparatus as claimed in any one of claims 1 to 4, wherein said binocular light converging means includes or is additionally at least one colour filter, and said at least one colour filter reduces the intensity of transmitted yellow light.

10. An apparatus as claimed in any one of claims 1, 3 or 4, wherein said apparatus includes adjustment means whereby the separation of the optical elements can be adjusted according to pupil separation of a user.

11. An apparatus as claimed in any one of claims 1 to 4, wherein said light converging means comprises two lenses.

12. An apparatus as claimed in any one of claims 2 to 4, wherein each of said optical elements comprises an optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

13. An apparatus as claimed in any one of claims 2 to 4, wherein each of said optical elements comprises a spherical optical wedge with a base, and said bases of said lenses are adjacent thereby forming base-in prisms.

14. An apparatus as claimed in any one of claims 1, 2 or 4, wherein said optical elements are 0.2 to 10 base lenses.

15. An apparatus as claimed in any one of claims 1, 2 or

4, wherein said optical elements are 0.25 to 1.5 base lenses.

16. An apparatus as claimed in any one of claims 1, 2 or 4, wherein said optical elements are approximately 0.5 base lenses.

17. An apparatus as claimed in any one of claims 1 to 3, wherein said optical elements are additionally prescription lenses.

18. An apparatus as claimed in any one of claims 1 to 4, wherein said optical elements are lenses provided as a pair of spectacles.

19. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements each comprising a spherical optical wedge with a base, wherein said bases of said optical elements are adjacent thereby forming base-in prisms.

20. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, wherein each of said optical elements comprises an optical wedge with a base, said bases of said optical elements are adjacent thereby forming base-in prisms, and said lenses are 0.2 to 10 base lenses.

21. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair of optical elements, wherein optical elements are additionally prescription lenses.

22. A method for reducing ocular muscular fatigue due to convergence demand comprising converging light prior to said light's incidence on a user's eyes by means of a pair

of optical elements, and adjusting the separation of the optical elements according to pupil separation of a user.

23. A method as claimed in any one of claims 19 to 22, wherein said optical elements are integral with each other.

24. A method as claimed in any one of claims 19 to 22, wherein said optical elements are magnifying optical elements.

23. A method as claimed in any one of claims 19 to 22, wherein said optical elements are a pair of lenses.

24. A method as claimed in any one of claims 19 to 22, wherein said optical elements are a pair of lenses each of which comprises an optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

26. A method as claimed in any one of claims 19 to 22, wherein said optical elements are a pair of lenses each of which comprises a spherical optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

27. A method as claimed in any one of claims 19, 21 or 22, wherein said optical elements are 0.2 to 10 base lenses.

28. A method as claimed in any one of claims 19 to 22, wherein said optical elements are 0.25 to 1.5 base lenses.

29. A method as claimed in any one of claims 19 to 22, wherein said optical elements are approximately 0.5 base lenses.

30. A method as claimed in any one of claims 19 to 22, wherein said optical elements are additionally prescription lenses.

31. A method as claimed in any one of claims 19 to 22, wherein said optical elements are additionally colour filters.

32. A method as claimed in any one of claims 19 to 22, wherein said optical elements are additionally colour filters that reduce the intensity of transmitted yellow light.

33. A method as claimed in any one of claims 19 to 21, wherein the method includes adjusting the separation of the optical elements according to pupil separation of a user.

34. A method as claimed in any one of claims 19 to 22, including providing said optical elements as a pair of spectacles.

35. A pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, each of said lenses comprising a spherical optical wedge with a base, wherein said bases of said lenses are adjacent thereby forming base-in prisms.

36. A pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, wherein said lenses are 0.2 to 10 base lenses.

37. A pair of spectacles for avoiding ocular muscular fatigue comprising a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user, wherein said spectacles are additionally prescription spectacles.

38. A pair of spectacles for avoiding ocular muscular

fatigue comprising:

a pair of convergent lenses for converging incident light, thereby reducing ocular convergence demand when said spectacles are worn by a user; and

adjustment means whereby the lenses' separation can be adjusted according to pupil separation of a user.

39. A pair of spectacles as claimed in any one of claims 35 to 38, wherein said lenses are 0.25 to 1.5 base lenses.

40. A pair of spectacles as claimed in any one of claims 35 to 38, wherein said lenses approximately 0.5 base lenses.

41. A pair of spectacles as claimed in any one of claims 35 to 38, wherein said lenses are integral with each other.

42. A pair of spectacles as claimed in any one of claims 35 to 38, wherein said lenses are magnifying lenses.

43. A pair of spectacles as claimed in any one of claims 35, 36 and 38, wherein said spectacles are additionally prescription spectacles.

44. A pair of spectacles as claimed in any one of claims 35 to 38, wherein said spectacles include, or said lenses additionally comprise, one or more colour filters.

45. A pair of spectacles as claimed in any one of claims 35 to 38, wherein spectacles include, or said lenses additionally comprise, one or more colour filters, and said one or more colour filters reduce the intensity of transmitted yellow light.

46. A pair of spectacles as claimed in any one of claims 35 to 37, wherein the spectacles are provided with adjustment means whereby the lenses' separation can be adjusted according to pupil separation of a user.

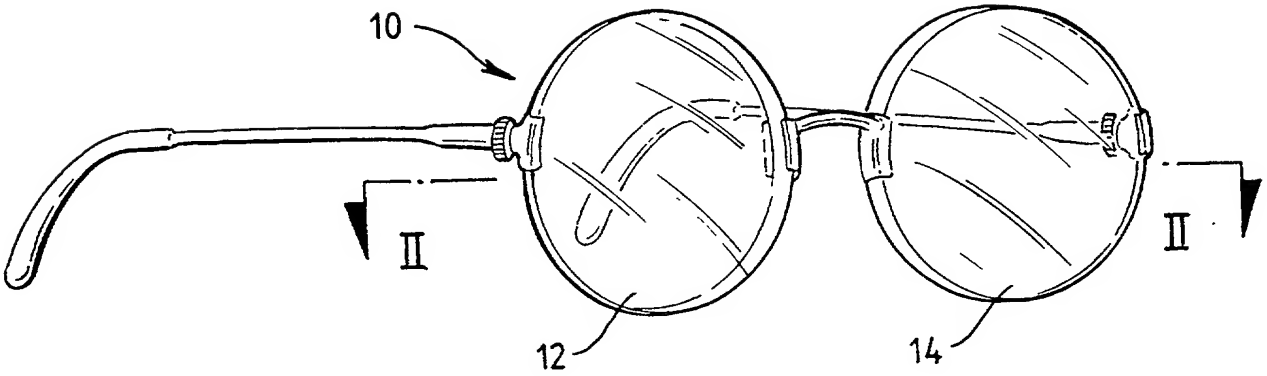


FIG. 1.

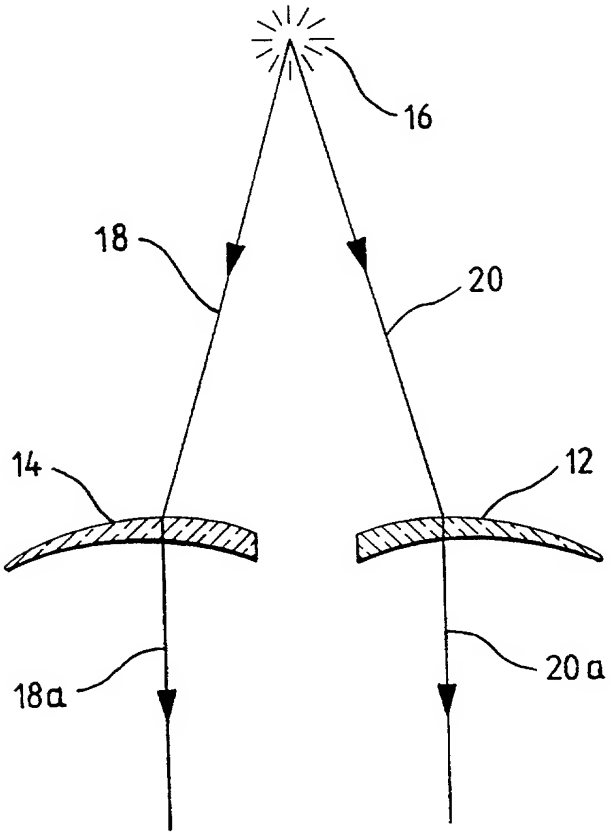


FIG. 2.

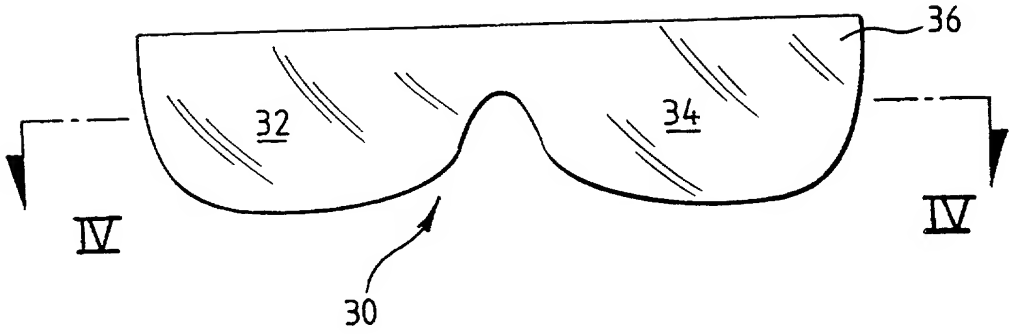


FIG. 3.

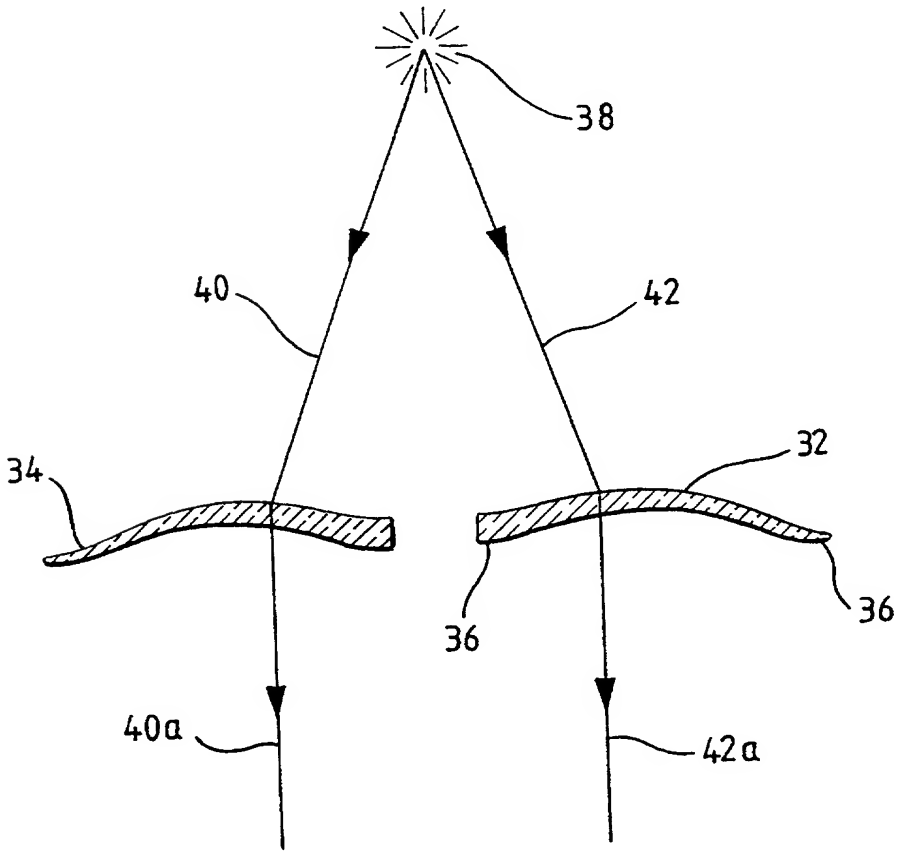


FIG. 4.

DECLARATION FOR USA PATENT APPLICATION

(including Design and National Stage PCT) Attorney's Docket ID: _____

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below adjacent to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought

on the invention entitled: **APPARATUS AND METHOD FOR AVOIDING OCULAR MUSCULAR FATIGUE**

the specification of which:

___ is attached hereto.
(or)
X was filed on 27 SEP 1999 as ~~U.S. Application No. or~~ PCT International Application No. PCT/AU99/00826

and (if applicable) was amended on 23 JUN 2000.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

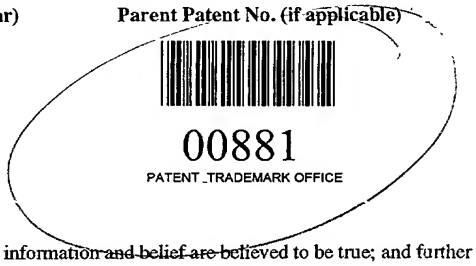
I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, where priority is not claimed, any foreign application for patent or inventor's certificate, or any PCT International application, having a filing date before that of the application on which priority is claimed. (___ ADDITIONAL APPLICATIONS IDENTIFIED ON ATTACHED SHEET)

Prior Foreign Application No.	Country	Day/Month/Year Filed	Priority Not Claimed
PP6180	AUSTRALIA	28/09/98	

I hereby claim the benefit under 35 U.S.C. 120 of any U.S. application(s), or 365(c) of any PCT application designating the U.S., listed below; and insofar as the subject matter of each claims of this application is not disclosed in the prior U.S. or PCT application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT filing date of this application. (___ ADDITIONAL APPLICATIONS IDENTIFIED ON ATTACHED SHEET.)

U.S. or PCT Parent Application No.	Parent Filing Date (Day/Month/Year)	Parent Patent No. (if applicable)

As a named inventor, I hereby appoint the registered practitioners of **LARSON & TAYLOR** associated with **Customer Number 000881** to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. Direct all correspondence to that Customer Number.



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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information ~~and belief are~~ believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1000 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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